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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/577,502	05/24/2000	Lauri Stahle	PM 270705 T297071US/Br/ht	6402

909 7590 10/27/2003

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EXAMINER	
RYMAN, DANIEL J	

ART UNIT	PAPER NUMBER
2665	5

DATE MAILED: 10/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/577,502	STAHLE ET AL.	
	Examiner	Art Unit	
	Daniel J. Ryman	2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 May 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2 and 4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: ref. 496a-496c (see page 10, line 8 and Fig. 4c). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The abstract of the disclosure is objected to because it exceeds 150 words in length. Correction is required. See MPEP § 608.01(b).

3. The disclosure is objected to because of the following informalities: on page 17, line 31 "CR-QBF 474" should be "CR-QBF 476" to match Fig. 4b.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-7, 11, and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al (USPN 5,621,752) in view of Popovic et al (USPN 6,370,397).

6. Regarding claims 1 and 13, Antonio discloses an apparatus for and method of receiving a signal of a desired user, which signal may arrive at the receiver in different components along

several different paths at several different delays (Fig. 2; col. 2, line 55-col. 3, line 5; and col. 4, lines 22-35), the apparatus comprising means for and the method comprising the steps of: receiving the signal by an antenna array composed of more than one element (col. 2, line 55-col. 3, line 5 and col. 3, lines 59-col. 4, line 7), demodulating the signal components by one or more rake branches (col. 2, line 55-col. 3, line 5; col. 4, lines 36-61; col. 8, lines 3-19; and col. 10, line 15-col. 11, line 25), searching for the incoming directions and delays of the received signal components (col. 3, line 59-col. 4, line 7 and col. 8, line 32-col. 9, line 5), determining the most favorable signal components (col. 8, line 32-col. 9, line 5), transmitting information on the signal components found to the rake branches (Fig. 5d and col. 10, line 15-col. 11, line 25), processing the signal at each rake branch by a beam former in such a way that the output of the beam former comprises a signal component received from a desired direction (Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), correlating the output signal of the beam former in correlators (Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), demodulating the correlated signal (col. 2, line 55-col. 3, line 5; col. 4, lines 36-61; col. 8, lines 3-19; and col. 10, line 15-col. 11, line 25), generating codes required by the correlators by a code generator (col. 3. line 59-col. 4, line 7; col. 4, lines 51-61), controlling the code generators and beam formers on the basis of the incoming direction and delay of the signal component (Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), monitoring the incoming direction and delay variation of the signal component on the basis of the output signals of the correlators and controlling the code generator and the beam formers by means of said monitoring (col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25). Antonio

possibly does not expressly disclose that the two-dimensional impulse response of the received signal is calculated by searching for the incoming directions and delays of the received signal components. Popovic teaches, in a system for receiving a multipath signal, "if an ideal pulse is transmitted over a multipath channel, the received corresponding signal appears as a stream of pulses, each pulse or path having a corresponding different time delay, as well as different amplitude and phase. Such a complex received signal is usually called the channel impulse response" (col. 1, lines 36-49). It would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the two-dimensional impulse response of the received signal by searching for the incoming directions and delays of the received signal components since the impulse response is defined as the incoming directions and delays of the received signal components.

7. Regarding claim 2, referring to claim 1, Antonio in view of Popovic discloses at least one first beam former and correlator, which receive the desired signal using the direction and delay calculated for this purpose (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

8. Regarding claims 3 and 14, referring to claims 2 and 13, Antonio in view of Popovic discloses controlling the code generator and the beam formers such that the correlation value indicated by the output signal of the correlator to which the signal received from the desired direction has been applied is as high as possible (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

9. Regarding claim 4, referring to claim 2, Antonio in view of Popovic discloses a calculation means adapted to calculate for the code generator a phase change and for the beam

formers an angular change, such that the correlation value indicated by the output signal of the first correlator is as high as possible (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

10. Regarding claim 5, referring to claim 1, Antonio in view of Popovic suggests a calculation means adapted to calculate control information for the code generator and the beam formers at predetermined intervals (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

11. Regarding claims 6 and 15, referring to claims 2 and 13, Antonio in view of Popovic discloses calculating the correlation from the calculated incoming direction and from the left and right sides of the incoming direction of the desired signal component (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

12. Regarding claims 7 and 16, referring to claims 6 and 15, Antonio in view of Popovic discloses that the beam formers are so controlled that if the correlation result calculated from the left or right side of the incoming direction is higher than the correlation result obtained from the calculated incoming direction, the beam formers following the direction of the desired signal are controlled to receive more of the signal from said direction (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

13. Regarding claim 11, referring to claim 1, Antonio in view of Popovic discloses different beam formers and correlators for signals of branch I and Q (Antonio: Figs. 4, 5a-d, and 6 and col. 5, lines 44-58).

14. Claims 8, 9, 12, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al (USPN 5,621,752) in view of Popovic et al (USPN 6,370,397) as applied to claims 2 and 13 above, and further in view of El-Tarhuni et al (USPN 6,201,828).

15. Regarding claims 8 and 17, referring to claims 2 and 13, Antonio in view of Popovic possibly does not expressly disclose calculating the correlation before and after the calculated delay of the desired signal component. El-Tarhuni teaches, in a system for receiving a multipath signal of a desired user, calculating the correlation before and after the calculated delay of the desired signal component in order to track transmission delay at low cost and with low complexity (Fig. 3; col. 2, lines 36-45; col. 2, lines 48-62; and col. 3, lines 20-62). It would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the correlation before and after the calculated delay of the desired signal component in order to track transmission delay at low cost and with low complexity.

16. Regarding claims 9 and 18, referring to claims 8 and 17, Antonio in view of Popovic in further view of El-Tarhuni discloses that the code generator is so controlled that if the correlation result calculated before and after the calculated delay of the desired signal component is higher than the correlation result obtained from the calculated delay, the code generator is controlled in the direction of said delay value (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25 and El-Tarhuni: Fig. 3; col. 2, lines 36-45; col. 2, lines 48-62; and col. 3, lines 20-62).

17. Regarding claim 12, referring to claim 11, Antonio in view of Popovic possibly does not disclose a code generator that generates the following codes having different phases: on-time I, on-time Q, late I, early Q. El-Tarhuni teaches, in a system for receiving a multipath signal of a

desired user, having a code generator that generates the following codes having different phases: on-time I, on-time Q, late I, early Q in order to track transmission delay at low cost and with low complexity (Fig. 3; col. 2, lines 36-45; col. 2, lines 48-62; col. 3, lines 20-62; and col. 5, lines 1-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to have a code generator that generates the following codes having different phases: on-time I, on-time Q, late I, early Q in order to track transmission delay at low cost and with low complexity.

18. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al (USPN 5,621,752) in view of Popovic et al (USPN 6,370,397) as applied to claim 1 above, and further in view of Lomp et al (USPN 6,272,168).

19. Regarding claim 10, referring to claim 1, Antonio in view of Popovic discloses that, for each branch of the rake receiver, the noise level is calculated in the incoming direction of the desired signal component in order to determine SNR (col. 10, lines 31-67) where it is implicit that calculating SNR requires knowledge of the noise level. Antonio in view of Popovic does not expressly disclose that the rake branch comprises a noise code generator and a number of correlators which are coupled to the outputs of the beam formers and to whose input is coupled the output of the noise code generator, and a demodulator coupled to the output of the correlators, the demodulator being adapted to calculate the noise level from the calculated incoming direction of the desired signal component. Lomp teaches, in a CDMA system, that a noise level can be determined by a noise code generator and a number of correlators (col. 21, lines 9-18) where it is implicit that the noise level can be calculated with equipment already present in the receiver. It would have been obvious to one of ordinary skill in the art at the time

of the invention to have the rake branch comprise a noise code generator and a number of correlators which are coupled to the outputs of the beam formers and to whose input is coupled the output of the noise code generator, and a demodulator coupled to the output of the correlators, the demodulator being adapted to calculate the noise level from the calculated incoming direction of the desired signal component in order to calculate the noise level for the incoming signal using only equipment already present in the receiver for the purpose of finding the signal with the highest SNR.

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Martin et al (USPN 6,324,160) see entire document which pertains to an adaptive receiver. Chang et al (USPN 6,320,899) see entire document which pertains to a two-dimensional demodulator in CDMA system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Ryman whose telephone number is (703)305-6970. The examiner can normally be reached on Mon.-Fri. 7:00-5:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (703)308-6602. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

Daniel J. Ryman
Examiner
Art Unit 2665

DJR

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